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POWERING THE FUTURE

Despite modern society's heavy dependence on fossil fuels for energy, most people are aware that the supply of these fuels is finite. As oil, in particular, becomes more costly and difficult to find, researchers are looking at alternative energy sources, including solar, wind, and even nuclear power. But which substitute—if any—is the right one?

Solar

Solar panels catch energy directly from the sun and convert it into electricity. One of the world's largest solar power stations is located near Leipzig, Germany, where more than 33,000 solar panels have the **capacity** to generate enough energy to power about 1,800 homes. But unlike the burning of fossil fuels, the process used to create all that solar energy produces no emissions.

Today, however, solar power provides less than one percent of the world's energy, primarily because the cost of the panels is still very high. And price is only one issue. Clouds and darkness also cause solar panels to produce less energy, which requires one to have additional power sources (such as batteries) available.

^ Windmills on hilltops creating clean green energy, in California, U.S.A.

Some scientists think the solution to this problem can be found in space—which they say is the ideal place to gather energy from the sun. With no clouds and no nighttime, a space-based solar power station could operate constantly. These stations would send the power back to Earth, which could then be turned into electricity for consumption.

Advocates of solar space stations say this technology would initially require a lot of money, but eventually it could provide continuous, clean energy that would be cheaper than other fuels. Also, unlike other energy sources, solar power from space will last as long as the sun shines, and will be able to **guarantee** everyone on Earth all the energy they need.

Wind

Wind—the fastest-growing alternative energy source—is another way of collecting energy from the sun. Wind is caused by the sun's heat rather than its light, and therefore, unlike solar power, it works well even on cloudy days.

All over Europe, incentives designed to decrease the dependence on oil and coal have led to a **steep** increase in wind-powered energy. Today, Europe leads the world in wind power, producing almost 35,000 megawatts,[1] the **equivalent** of 35 large coal-powered plants. North America remains a distant second, producing just over 7,000 megawatts.

1 A **megawatt** is a unit of power.

Despite its successes, some oppose wind-power development, saying the turbines[2] are both noisy and ugly. Just outside England's Lake District, a protected national park, seven wind towers are planned, each about 40 meters (130 feet) tall. Many locals are protesting. "This is a high-quality landscape," says one local homeowner. "They shouldn't be putting those things in here."

There are other challenges, too. If the wind doesn't blow, the turbines are not able to produce adequate energy. As a result, other power sources are needed. In contrast, a strong wind can create too much power. In cases like this, the energy company must sell the extra power at a much-reduced rate, which is not good for business.

What's needed for both wind and solar is a way to store a large energy surplus.[3] However, most systems are still decades away from making this a reality. On the plus side, both wind and solar enable people to generate their own energy where they live: People can have their own windmills or solar panels, with batteries for calm days.

Nuclear

In the 1970s, nuclear was seen as the main energy alternative. Nuclear power produces vast amounts of electricity more cheaply than gas or coal, with no carbon emissions. For a number of years in the 1980s and '90s, however, use of nuclear power **declined** due to accidents, concerns about nuclear waste storage and **disposal**, and high construction costs.

Today, times are changing. Worldwide, about 432 plants now generate 13 percent of the planet's electric power, and some countries have invested heavily in nuclear energy. France, for instance, gets three quarters of its electricity from nuclear power, the highest of any country. China has started to build one or two new plants a year, and India has also begun to **utilize** nuclear energy on a large scale. However, there are still concerns about the safety of nuclear power, as seen most recently at the Fukushima nuclear power plant in Japan. The country had to close its nuclear reactor when the plant was hit by a tsunami and, as a consequence, began releasing substantial amounts of radioactive materials. Many still believe, however, that nuclear power is one of the future's greenest energy alternatives.

In the end, is any of these sources alone the answer to our current energy problems? The short answer is no, but used in some combination—along with other power sources—we may find ways to reduce and eventually eliminate our dependence on fossil fuels.

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2 A **turbine** is a machine that uses water, steam, or wind to turn a wheel to produce electricity.

3 If you have a **surplus** of something, you have more of it than you need.